

Installation Guide

Installation of Elektra VMS Sign (Site Infrastructure & Sign)

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1 INSTALLATION

The installation method will vary depending on which mounting option is chosen for the sign Multipole, Simple Monopole (Stanchion) or Monopole (Cantilever).

1.1 GENERAL

1.1.1 Scope

This guide outlines the activities required to install the Elektra VMS Family of VMS Signs.

1.1.2 Purpose

To provide the installation sub-contractor with information to enable the sub-contractor to carry out a risk assessment of the operation and produce a safe system of work. A copy of the sub-contractors Risk Assessment and Method Statement must be submitted to Siemens Project Manager for review prior to any works commencing.

1.1.3 References

No.	Reference	Title	Version	
1	667/CI/44010/000	Elektra Multipole Spacing and Brackets (Copy included as Appendix C of this document)	Latest	Siemens Drawing
2	667/CI/44020/000	Elektra Stanchion Foundation / Mounting Guidelines (Copy included as Appendix B of this document)	Latest	Siemens Drawing
3	667/7/44335/ETC	Elektra Multipole Variants (Copy included as Appendix D of this document)	Latest	Siemens Drawing
3	QA PROC-42-800-320	Safety Method Statement for Sub-contracted / hired, mechanical lifting operations (lorry loaders, mobile cranes and MEWPs)	Latest	Siemens Document
4	667/HB/45040/000	Isolators and Feeder Pillars General Handbook	Latest	Siemens Document

1.1.4 Operatives

Only Approved Sub-contractors registered to NHSS8 will be used to carry out the works.

Only operatives assessed as competent in the relevant modules under the National Highways Sector Scheme 8 will be allowed to carry out the works.

Supervisors and operatives carrying out excavation and reinstatement works must be NRSWA registered Plant operators must hold a relevant competency card e.g. CPCS, PAL.

1.1.5 Specialised tools, Equipment & Materials

Standard installation tools -

- Signs, Cones & Barrier as required.
- Hiab or other suitable lifting equipment
- MEWP where required

- “A” Frame Ladders
- Suitable torque wrench for torques as defined in section 1.1.14. Note that for tightening base nuts on either the simple monopole or cantilever signs a deep socket or other suitable adaptor may be required due to the length of protruding studs.

1.1.6 Planning

The sub-contractor will comply with all health and safety legislation including the Construction (Design and Management) Regulations.

Ensure Statutory Services drawings for the site available.

The size and the weight of sign **MUST** be notified to sub-contractor.

1.1.7 Site Survey

A site survey is to be completed by Siemens, accompanied by a representative of the client and ideally a representative of the civils sub-contractor.

- A thorough inspection of the site and its surroundings will take place.
- This is to finalise the exact location, height and orientation (i.e. the point on the roadway that the signs should be aimed at for clear viewing) of the signs.
- In the case of a Simple Monopole the position of the pole with respect to the edge of the sign will also be established if not already decided.
- The agreed location and orientation is to be recorded in a suitable manner. Note that if it is decided to mark the site with road paint this may not survive if there is a significant gap in time between the survey and the installation (particularly if painted onto grass) so consideration should be given to other, more robust methods.
- E.g. Photographs and notes are taken to show the method of access, pedestrian right of way, traffic management and required height and orientation of displays.
- Locations of power feeder pillars are identified and lengths of cable runs established (this may affect the choice of secondary isolator to be fitted in the feeder pillar (see Siemens Document 667/HB/45040/000))

It is important that detail of the final position, height and orientation of the signs is accepted by the customer at this stage in the process.

1.1.8 Team Structure

Two teams will be required to complete installation and commissioning of the signs.

- A sub-contractor undertaking the civil works and traffic management.
- Siemens engineers to make the supply connections and commission the sign.

The sub-contractors are responsible for:

- Traffic Management
- Trenching, Ducting and chambers.
- Installation of Mains Feeder Pillars where required
- Installation of Poles
- Installation of Signs (including provision of the lifting equipment)

The sub-contractor *may* be responsible for:

- Installation of the power cable between the mains cut out and the sign (requires G39 trained operative) and any communication cables required.

This will be decided on a contract by contract basis, please consult Siemens Project Manager for clarification on any particular contract.

The Siemens engineers are responsible for:

- Supervision of the sub-contractor
- Electrical connections to the mains cut out (requires G39 trained operative) and the sign
- Electrical safety tests
- Commissioning of the sign
- Customer site acceptance

The Siemens engineers *may* be responsible for:

- Installation of the power cable between the mains cut out and the sign (requires G39 trained operative) and any communication cables required.

This will be decided on a contract by contract basis, please consult Siemens Project Manager for clarification on any particular contract.

1.1.9 Traffic Management

At the site survey, traffic management plans are determined.

Local traffic management will be implemented for road speeds of 40 mph and below by Siemens staff or their sub-contractor. If the survey identifies a more extensive scheme, specialist traffic management suppliers will be employed.

All traffic management is in compliance with the New Roads and Street Works Act and Chapter 8 of the Traffic Signs Manual

1.1.10 Protection of Surfaces

Prior to any work, photographs are taken to record the existing condition of the site. Replaceable Surfacing e.g. paving slabs can then be lifted and carefully stacked in a safe location. Excavation, installation and backfill can then commence.

When this is complete the surfacing can be re-laid.

In some instances bricks or pavers require cutting, this is completed with the appropriate cutter. All operatives **MUST** wear the correct PPE at all times.

Reinstatement is to be carried out in accordance with the New Road and Streetworks Act.

When it is necessary to work near street furniture, if it is viable, the street furniture will be removed for the duration of work, extra special care will be taken to avoid any damage.

When the work has been completed a photograph is taken to provide evidence that the work has not made any detrimental effect to the surfaces.

1.1.11 Protection of the Public

Traffic Systems for vehicles are to be set up in accordance to The New Roads and Streetworks Act and Chapter 8 of the Traffic Signs Manual as described previously.

When pedestrians are required to share the walkway with ladders, scaffold towers and engineers, ensure that at all times there is adequate room (1.5 metres) for an individual with pushchair to pass.

Obstructions are clearly marked and barriers erected.

1.1.12 1st Site Visit

On arrival on site, risk assessments are completed, the site is surveyed in conjunction with the statutory services documentation.

Traffic management is to be in place and a suitable safe working area maintained. See Safety Method Statement "Traffic Management on All Purpose & High Speed Roads"

See Method Statement “Small excavations & narrow trench-work”:

- It is mandatory to complete a cable location survey with the appropriate Cable Avoidance Tool (CAT).
- Any cable paths should be marked out on the surface and when digging extra care is taken to avoid the location.
- The worst case scenario should always be assumed where the cable could be just below the surface and not marked with a ribbon.
- CAT monitoring should be repeated periodically during the excavation.

If it can be guaranteed that the site is clear of all services, power digging is allowed. Repeat CAT scanning should be completed at each 400 mm depth.

The installation of the poles and/or anchor frame should be completed. (See details for the individual sign types in the following sections).

Installation of cable ducts, complete with draw ropes, between the relevant sign pole and feeder pillar should be completed.

1.1.13 2nd Site Visit

On arrival on site, risk assessments are completed, the site is surveyed in conjunction with the statutory services documentation.

Traffic management is to be in place and a suitable safe working area maintained. See Safety Method Statement “Traffic Management on All Purpose & High Speed Roads”

The sign will be delivered to site and suitable lifting equipment should be available to hoist the sign in to place.

The operator of the lifting equipment will be required to hold a valid CPCS or similar competency card and the relevant operating certification for the equipment. This may be checked at any time and if not available the operator will be requested to leave site.

IMPORTANT	<i>See Siemens QAPROC-42-800-320 Safety Method Statement for Sub-contracted / hired, mechanical lifting operations (lorry loaders, mobile cranes and MEWPs), which refers to the procedures required.</i>
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The installation of the Sign should be completed. (See details of the individual sign types in the following sections).

The final installation of mains (and communications) cables will be performed.

1.1.14 Torque Settings

The level of torque to be used during installation to tighten the nuts/bolts is dependent on their size. The values required are as follows:

M30 – 1350 Nm
M24 – 660 Nm
M20 - 380 Nm
M16 - 190 Nm
M12 - 75 Nm

2 MULTIPOLE SIGN

2.1.1 Installation of Poles

On Elektra Multipole signs the poles are always placed towards the sign edges in order to permit the maximum possible maintenance access via doors on the rear. Regardless of the size of the sign, there will only ever be two mounting poles for a multi-pole Elektra sign.

This places restrictions on the placing of poles, which must be very accurately positioned.

For details on the required positions of poles Siemens drawing 667/CI/44010/000 (included in this document as Appendix C – Elektra Multipole Spacing and brackets) should be consulted.

- It will be necessary to know the width and height of the Elektra sign to be installed, and then all the information relating to the position (including tolerance) of the poles may be calculated / established from this drawing.

A foundation drawing will be available from the Siemens project manager

- A specific drawing if the sign size and type is unique
- A generic drawing if more than one sign of the same style or size/type is used on the same job

In either case the precise detail of sign position, height and orientation should have been established during the site survey (see section 1.1.7) and this data should be consulted, along with the relevant foundation drawing, before starting work.

All Elektra Multipole signs are supplied with a matched pair of poles (see Appendix D – Elektra Multi Pole Variants)

- A plain pole
- A service pole containing a cable entry aperture (below ground level) and a tapped gland hole (towards top of pole) for the mains cable exit to the sign.

The service pole must be installed on the same side of the sign as the mains cable entry gland on the rear of the sign.

- This will NORMALLY be the side of the sign furthest away from the road, but it is important to check this prior to installation. The DEFAULT position of the mains cable entry gland on all multipole signs is on the left hand side when viewed from the front face.
- Cable ducting, complete with draw rope, will be required from the base of the service pole to the feeder pillar.
- Any communications cables must also be routed to the base of the service pole.

Operations required -

- Excavate foundation as per recommended area and depth
- Excavate trench for ducting between service pole and feeder pillar
- Place ducting, complete with draw rope, between service pole
- Shutter off top edge level - ensure that all shuttering is supported
- With suitable lifting equipment, lift poles into place

IMPORTANT

Specification of pole (weight and finish) could affect lifting method employed

- Position poles and temporarily secure in position
- Ensure that cable entry gland hole near top of service pole is facing rearwards (see Figure 7)
- Ensure that the cable draw rope is routed to the top of the service pole and suitably tied off
- Ensure that the tops of the two poles are level with each other, irrespective of any slope on the ground below
- Ensure that cable duct protrudes into the base of the service pole
- Pour concrete level with top of shuttering, tamp down and level surface
- Allow 72 hours for concrete to cure, ensuring suitable protection, barriers etc, in place to prevent access and/or injury to members of the public as the concrete cures

2.1.2 Installation of Sign

Prior to the install, the site area must be prepared with suitable hard-standing for the delivery vehicle.

The sign is fixed to the poles using four U-bolts. The U-bolts interface with slotted brackets which are fitted before the sign leaves the factory.

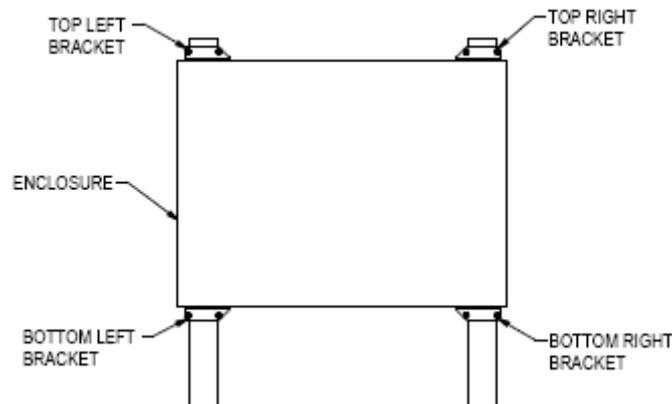


Figure 1 - Location of U-Bolt Brackets (View from front of sign)

The upper U-bolt brackets incorporate holes for the attachment of lifting shackles. The sign should only be lifted from these points. Suitable shackles must be fitted to these points prior to lifting the sign. One shackle should be fitted to the upper left hand bracket and one to the upper right hand bracket – DO NOT attempt to lift the sign from one end only.

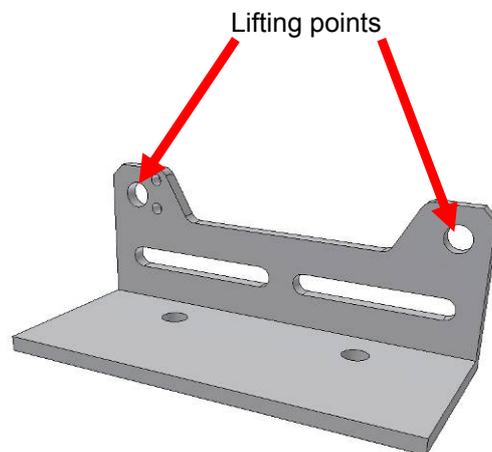


Figure 2 – Multipole sign lifting points

With the sign suitably supported, and before lifting the sign into position, loosely assemble the upper U-bolts with their associated parts (as supplied) to the brackets on the sign.

IMPORTANT

**Only "A" Frame step ladders are to be used.
On no account are ladders or steps to be leant up against the sign body or the pole.
Use of the "A" Frame step ladders MUST comply with the Siemens "Access & Egress Code of Practice" Volumes 1 & 2**

IMPORTANT

Do not work underneath the sign at any time when it is supported from lifting eyes. Ensure suitable chocking / blocks etc in place at all times.

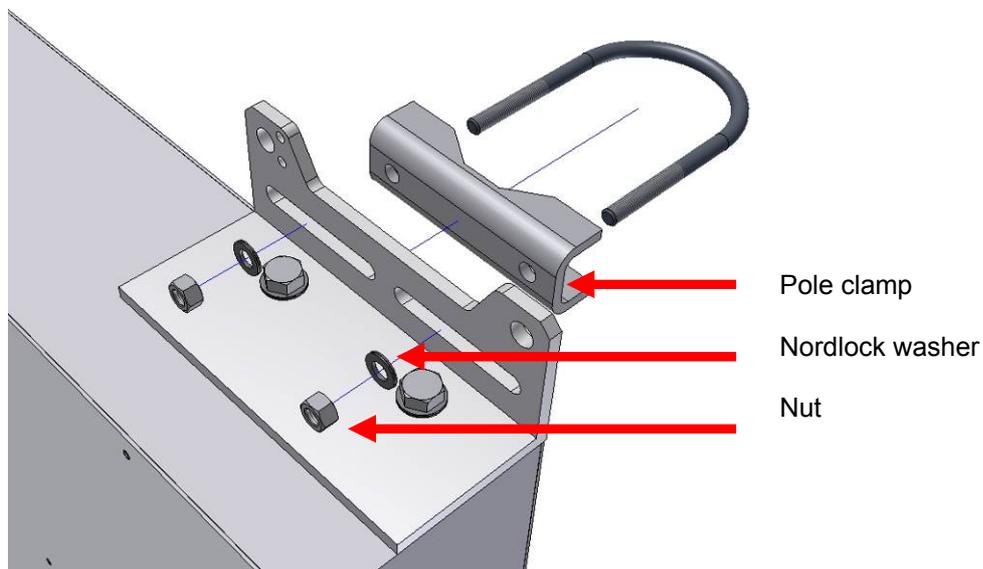


Figure 3 - Upper U bolt assembly

Lift the sign into position slightly above the final mounting height such that it may be lowered into position with the upper u-bolts around the poles. Care should be taken not to scratch the poles during this operation.



Figure 4 - Lifting sign into position

Ensure the enclosure is level and at the correct height then loosely tighten the nuts on the upper U-bolts.

IMPORTANT

**Only "A" Frame step ladders are to be used.
On no account are ladders or steps to be leant up against the sign body or the pole.
Use of the "A" Frame step ladders MUST comply with the Siemens "Access & Egress Code of Practice" Volumes 1 & 2**

Take the Pole Clamps for the lower u-bolt assemblies and, **without placing hands or fingers between the sign and pole at any time**, position them behind the sign and loosely fit lower U-bolts, washers and nuts.

IMPORTANT

Do not place hands between the pole and the sign during this fitting operation. Locate packing blocks between sign and pole to keep the parts apart during this operation

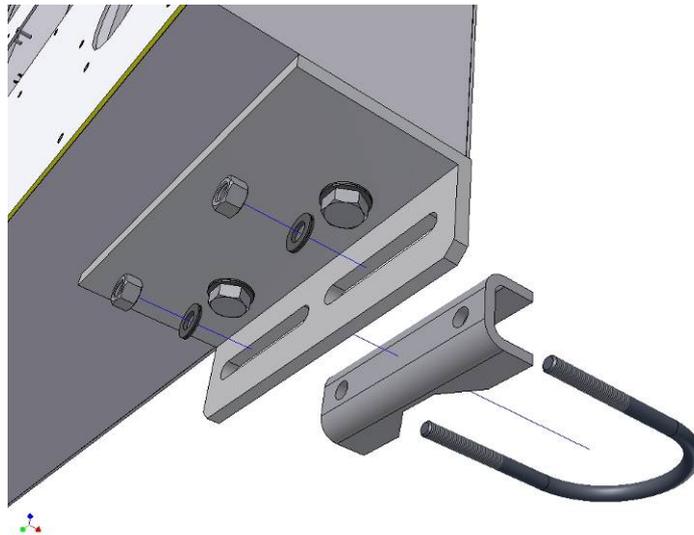


Figure 5 - Lower U-bolt assembly

When both lower U-bolts are loosely fitted, fully tighten U-bolt nuts to the required torque (see section 1.1.14)

Fully tighten upper U-bolt nuts to the required torque (see section 1.1.14)

Having released the tension on the lifting strops, remove the shackles from the upper U-bolt brackets



Figure 6 - Multipole enclosure fitted to the Poles

IMPORTANT

Do not work underneath the sign at any time when it is supported from lifting eyes. Ensure suitable chocking / blocks etc in place at all times.

2.1.3 Cable Installation

Initial cable installation may take place as part of the 1st site visit, during the erection of the poles, with the final pulling into the sign taking place during the 2nd site visit once the sign is mounted on the poles.

In this case the cable can be pulled into place during installation of the poles, when the poles are at ground level (i.e. before they are raised into position). This reduces the need for working at height. The cable will then be available for final connection during installation of the sign.

When pulling the cable in this manner, it is important to leave sufficient cable length available for connection to the sign-

- Leave a length of spare cable equal to the height of the pole above ground level.
- The cable should be left suitably coiled to prevent damage prior to installation of sign.

Once the sign is securely mounted on the poles (2nd visit) uncoil the cable at top of pole and if not already done so pull cable through the gland hole in the pole.

Fit a suitable gland (Siemens part number 915/4/10316/000 is recommended) over the cable followed by a suitable length of flexible trunking (copex – Siemens part number 915/4/10315/004 is recommended) over the cable.

Feed the cable carefully through the gland on the rear of the sign into the sign enclosure itself.

IMPORTANT

There are many delicate electronic components on the rear of the circuit boards in the sign. Extreme care must be taken when feeding the cable through not to damage any of the boards.

Connection of the cable to the sign will be performed by Siemens engineers.



Figure 7 - Mains Cable Interface to Pole

Alternatively, the cable may be installed after the sign has been securely mounted.

Attach draw rope to the cable. Check Risk Assessment and if safe to do so pull the cable through and up the pole into the sign from the feeder pillar.

IMPORTANT

The feeder pillar may only be accessed by an operative who is G39 trained and DISTRIBUTION NETWORK OPERATOR DNO. REGIONAL ELECTRICITY COMPANY REC Authorised

Pull cable through the gland hole in the pole.

Fit a suitable gland (Siemens part number 915/4/10316/000 is recommended) over the cable followed by a suitable length of flexible trunking (copex – Siemens part number 915/4/10315/004 is recommended) over the cable.

Feed the cable carefully through the gland on the rear of the sign into the sign enclosure itself.

IMPORTANT

There are many delicate electronic components on the rear of the circuit boards in the sign. Extreme care must be taken when feeding the cable through not to damage any of the boards.

Connection of the cable to the sign will be performed by Siemens engineers.

3 SIMPLE MONOPOLE (STANCHION) SIGN

3.1.1 Installation of foundation and anchor frame

Simple Monopole signs are designed to have a minimal impact on the streetscape. The pole (stanchion) may be fitted in one of five positions along the base of the sign, the actual position being determined during the design phase. Only one set of mounting holes will be present in the base of the sign so it is not possible to install incorrectly.

The pole is mounted to a frame (anchor frame) buried in the concrete foundation which permits a limited range of angle adjustment and levelling of the sign. This must be correctly positioned in the foundation and the concrete should be allowed to set fully prior to installation of the pole or sign.

A foundation drawing will be available from the Siemens project manager

- A specific drawing if the sign size and type is unique
- A generic drawing if more than one sign of the same style or size/type is used on the same job

In either case the precise detail of sign position, height and orientation should have been established during the site survey (see section 1.1.7) and this data, along with the relevant foundation drawing, should be consulted before starting work.

Full detail of the anchor frame mounting is contained in Siemens drawing 667/CI/44020/000 (included in this document as Appendix B – Elektra Stanchion foundation guidelines) which should also be consulted before starting work.

Operations required -

- Excavate foundation as per recommended area and depth
- Excavate trench for ducting between sign base and feeder pillar
- Place ducting, complete with draw rope, between sign base and feeder pillar
- Shutter off top edge level - ensure that all shuttering is supported.
- Assemble studs through template and screw nuts on, being sure to leave sufficient thread protruding through template (See Appendix B – Elektra Stanchion foundation guidelines)
- Pour concrete level with top of shuttering, locating the anchor frame as shown in the foundation drawing, tamp down and level surface. Note that template and levelling nuts should be proud of the concrete surface to permit later removal and adjustment as appropriate.
- Ensure that the frame is correctly angled with respect to the roadway so that the sign, when mounted, will point in required direction (use data from survey to confirm this).
- Ensure that cable duct end is through entry point in template (see Figure 8)
- Allow 72 hours for concrete to cure (ensuring suitable protection, barriers etc, in place to prevent access and/or injury to members of the public as the concrete cures) before placing pole and/or sign



Figure 8 – Installed anchor frame BEFORE removal of template and reinstatement of the site

Note that any cabling for the sign (mains and/or signal) has to feed up the centre of the (hollow) pole. It is essential to run ducting from feeder pillar and / or communications equipment into the foundation with draw rope(s) during the foundation works.

IMPORTANT

If there is any doubt regarding the installation or final position of the foundation and/or anchor frame the Siemens project manager should be consulted before starting work.

3.1.2 Fitting pole to anchor frame

The sign is delivered to site with the pole and sign enclosure as separate items.

Position the pole so it is lying on the ground with the base next to the foundation plinth. Thread a fish tape or cobra through the hole in the top of the pole until it protrudes from the base. Tie the end of the draw rope coming out of the plinth cable duct to the end of the fish tape. Pull the fish tape through the pole with the draw rope on the end of it and knot off the draw rope. Be sure to leave at least 1.5m of draw rope protruding from top of pole.



Figure 9 – Threading the draw rope through the pole

Remove the template (mounting frame top plate) and re-fit the nuts, levelling as appropriate with a small spirit level. Lift the pole and lower it onto the foundation plinth's bolts. Ensure that the draw rope is tight and doesn't get trapped during this operation.



Figure 10 - Erecting the pole

Add the four nuts to secure the pole to the foundation. Check that the pole is vertical making minor adjustments to the upper and lower nuts as necessary.



Figure 11 - Checking the pole is vertical

Adjust the position of the pole by rotating it left to right so that the sign (when fitted) will point to the correct point on the road carriageway (use data from survey to confirm this)).

- Tighten the nuts to the required torque (see section 1.1.14)
- Fit and tighten the lock nuts
- Bind the nuts and stud ends with tape to keep the threads clear of debris
- Back fill any void under the base of the pole and bolt boxes with load bearing grout (see Appendix B – Elektra Stanchion foundation guidelines). Failure to do this may cause excessive deflection in pole
- Complete reinstatement works around pole base

3.1.3 Fitting the sign to the pole

The sign will be delivered with two M16 eye-bolts fitted to the top surface for lifting. Ensure that these are fully screwed in and at right angles to the sign face as shown.



Figure 12 - Correct orientation of eye bolts

- Attach suitable lifting equipment to the eye-bolts.

IMPORTANT

Only "A" Frame step ladders are to be used.

On no account are ladders or steps to be leant up against the sign body or the pole.

Use of the "A" Frame step ladders MUST comply with the Siemens "Access & Egress Code of Practice" Volumes 1 & 2

Once the sign is lifted from the ground, it may swing on the lifting equipment and is particularly vulnerable to the effects of wind. Ensure good lifting practice e.g. the use of a banksman and / or tether lines to minimise any such movement and therefore any potential danger.

Until the sign is bolted to the top of the pole DO NOT stand on step ladders with any part of the body above the top of the pole / base of the sign. All work to locate and bolt the sign to the pole must be completed from BELOW, AND TO ONE SIDE OF, the sign body. Ensure load is supported by the lifting equipment until all bolts fitted and tightened.

The action of passing the draw rope into the base of the sign must be done carefully to avoid trapping hands etc between the sign and the pole, see notes below,

Do not work directly underneath the sign at any time when it is supported from lifting eyes.

- Wrap suitable packing material around the top of the pole (taking particular care to cover the corners of the pole top plate) to prevent damage to the sign during the next steps –
 - Arrange the draw rope to come out of the pole and down the side of it as shown in Figure 13
 - Lift the sign using the eye bolts and position it slightly to one side of the pole as shown in Figure 13
 - Be very careful not to damage either the door or the front face of the sign during this procedure
 - Feed the rope into the large hole in the bottom of the sign enclosure, making sure that it is pushed well into the sign to prevent it falling back out again as the sign is subsequently manoeuvred

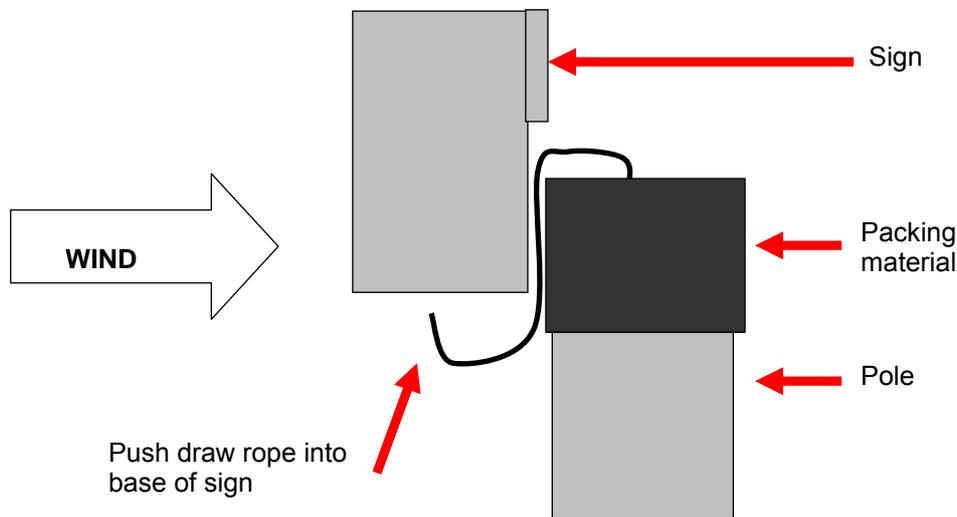


Figure 13 - Feeding draw rope into single monopole

- Lift and position the sign slightly above the pole (see Figure 14)
- Remove the packing material used to protect pole during previous operations
- Manipulate the sign so that the four holes in its base align with the corresponding holes in the pole.
- It is considered the best method to align the holes is to use two hole alignment tools pushed through holes at the top of the pole and then lower the sign on to these.
- As the sign is continued to be lowered the alignment tools can lever the sign to the desired position

IMPORTANT

At no time should hands be placed in between the sign and the top of the pole

All alignment work to be undertaken with the operator beneath the level of the sign base, standing to one side i.e not directly under the sign body.

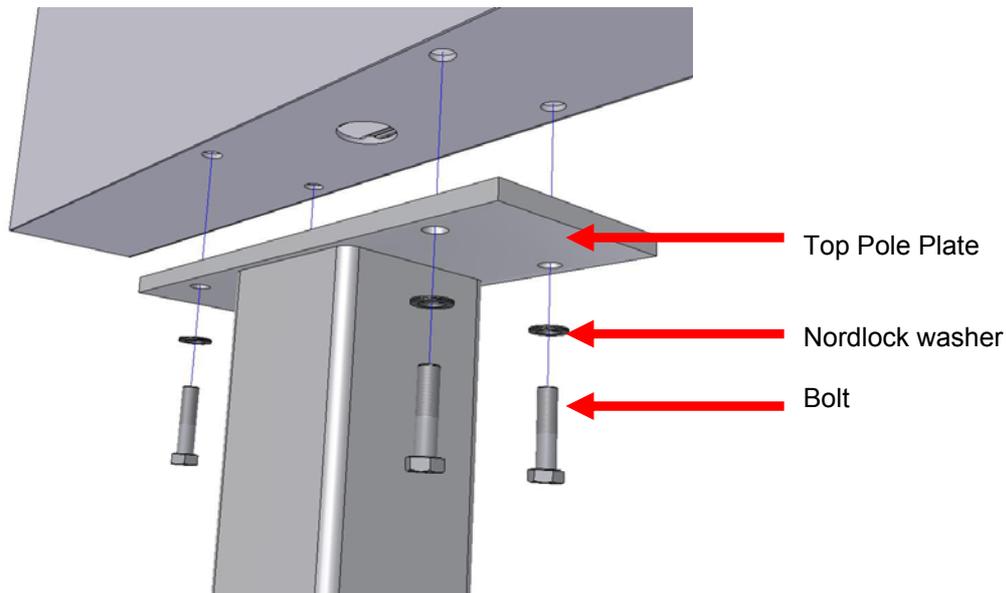


Figure 14 - Top pole bolt assembly

When the sign is in position, fit the supplied anti-vibration washers to the bolts and insert the bolts up through the holes in the pole top plate and into the sign. Tighten bolts to the required torque (see section 1.1.14).

The sign will now be secured to the pole. Remove the lifting gear.

DO NOT remove the eye-bolts from the top of the sign as they are designed to be left in place in case the sign need to be moved at a later date.

3.1.4 Cable Installation

This will take place as part of the 2nd site visit once the sign is firmly secured to the pole.

Attach a draw rope to the cable. Check Risk Assessment and if safe to do so pull the cable through and up the pole into the sign from the feeder pillar.

IMPORTANT	<i>The feeder pillar may only be accessed by an operative who is G39 trained and DISTRIBUTION NETWORK OPERATOR DNO. REGIONAL ELECTRICITY COMPANY REC Authorised</i>
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Connection of the cable to the sign will be performed by Siemens engineers.

IMPORTANT	<i>There are many delicate electronic components on the rear of the circuit boards in the sign. Extreme care must be taken when feeding the cable through not to damage any of the boards.</i>
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IMPORTANT

***Only "A" Frame step ladders are to be used.
On no account are ladders or steps to be leant up against the
sign body or the pole.
Use of the "A" Frame step ladders MUST comply with the
Siemens "Access & Egress Code of Practice" Volumes 1 & 2***

4 MONOPOLE (CANTILEVER) SIGN

4.1.1 Installation of foundation and Anchor Frame

Elektra cantilever signs are monopole signs with the additional benefit of sign elevation adjustment. The Cantilever pole is always located at one end of the sign enclosure.

The pole is mounted to a frame (anchor frame) buried in the concrete foundation which permits a limited range of angle adjustment and levelling of the sign. This must be correctly positioned in the foundation and the concrete should be allowed to set fully prior to installation of the pole or sign.

A foundation drawing will be available from the Siemens project manager

- A specific drawing if the sign size and type is unique
- A generic drawing if more than one sign of the same style or size/type is used on the same job

In either case the precise detail of sign position, height and orientation should have been established during the site survey (see section 1.1.7) and this data, along with the relevant foundation drawing, should be consulted before starting work.

Full detail of the anchor frame mounting is contained in Siemens drawing 667/CI/44020/000 (included in this document as Appendix B – Elektra Stanchion foundation guidelines) which should also be consulted before starting work.

- Excavate foundation as per recommended area and depth
- Excavate trench for ducting between sign base and feeder pillar
- Place ducting, complete with draw rope, between sign base and feeder pillar
- Shutter off top edge level - ensure that all shuttering is supported.
- Assemble studs through template and screw nuts being sure to leave sufficient thread protruding through template (See Appendix B – Elektra Stanchion foundation guidelines)
- Pour concrete level with top of shuttering, locating the anchor frame as shown in the foundation drawing, tamp down and level surface. Note that template and levelling nuts should be proud of the concrete surface to permit removal and adjustment as appropriate.
- Ensure that the frame is correctly angled with respect to the roadway so that the sign, when mounted, will point in required direction (use data from survey to confirm this).
- Ensure that cable duct end is through entry point in template (see Figure 8)
- Allow 72 hours for concrete to cure (ensuring suitable protection, barriers etc, in place to prevent access and/or injury to members of the public as the concrete cures) before placing pole and/or sign

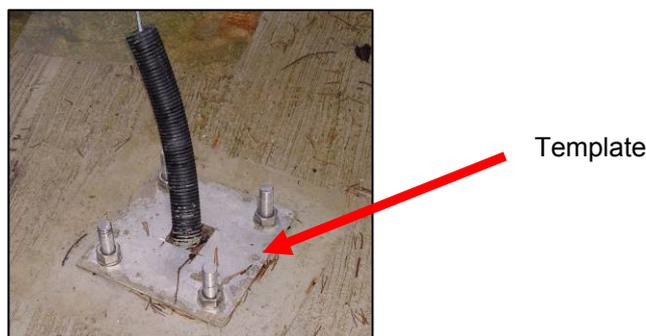


Figure 15 – Installed Anchor Frame BEFORE removal of template and reinstatement of the site

Note that any cabling for the sign (mains and/or signal) has to feed up the centre of the (hollow) cantilever. It is essential to run ducting from any feeder pillar and / or communications equipment into the foundation with draw rope(s) present during the foundation works.

IMPORTANT

If there is any doubt regarding the installation or final position of the foundation and/or anchor frame the Siemens project manager should be consulted before starting work.

4.1.2 Cantilever

The sign is delivered to site with the cantilever and sign enclosure as separate items.

Position the cantilever so it is lying on the ground with the base next to the foundation plinth. Thread a fish tape or cobra through the conduit hole in the top of the cantilever until it protrudes from the base. Tie the end of the draw rope coming out of the plinth cable duct to the end of the fish tape. Pull the fish tape through the cantilever with the draw rope on the end of it and knot off the draw rope.



Figure 16 – Threading the draw rope through the cantilever

Remove the template (top plate) and re-fit the nuts, levelling as appropriate with a small spirit level. Lift the cantilever and lower it onto the foundation plinth's bolts. Ensure that the draw rope is tight and doesn't get trapped during this operation.



Figure 17 - Erecting the Cantilever

Add the four nuts to secure the cantilever to the foundation. Check that the cantilever is vertical making minor adjustments to the upper and lower nuts as necessary.



Figure 18 - Checking the Cantilever is Vertical

Adjust the position of the cantilever by rotating it left to right so that the sign (when fitted) will point to the correct point on the road carriageway (use data from survey to confirm this).

- Tighten the nuts to the required torque (see section 1.1.14)
- Fit and tighten the lock nuts
- Bind the nuts and stud ends with tape to keep the threads clear of debris
- Back fill any void under the base of the pole and bolt boxes with load bearing grout (see Appendix B – Elektra Stanchion foundation guidelines). Failure to do this may cause excessive deflection in pole
- Complete reinstatement works around pole base

4.1.3 Fitting the sign to the cantilever

The sign will be delivered with two M16 eye-bolts fitted to the top surface for lifting. Ensure that these are fully screwed in and at right angles to the sign face as shown in Figure 19 (2).

Attach suitable lifting equipment to the eye-bolts.

Loosely attach the two (upper) swinging arm plates to the cantilever frame.

The lower pivot plates may have either holes or slots in them to mount the sign, for design reasons, and the process of hanging the sign is slightly different for each type.

IMPORTANT	<p><i>Only “A” Frame step ladders are to be used. On no account are ladders or steps to be leant up against the sign body or the pole. Use of the “A” Frame step ladders MUST comply with the Siemens “Access & Egress Code of Practice” Volumes 1 & 2</i></p>
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If the lower pivot plates have slots in them, proceed as follows -

- Insert the two lower bolts and washers into the sign, and adjust them so that there is approximately 25mm free thread showing.
- Lift the sign using the eye bolts and position it next to the cantilever frame. Lower the sign carefully so that the already fitted bolts drop into the slots on the lower pivot plates.
- Ensure that the sign pivots with the bolts at the **bottom** of the slots and hand tighten the bolts.

Title: Installation of Elektra VMS Signs (Site Infrastructure & Sign)

- Add the bolts to the two swinging arm plates, reduce tension on the slings and adjust the vertical angle as required. Tighten all the bolts to the required torque.

If the lower pivot plates have holes in them, proceed as follows -

- Position the sign enclosure between the two lower pivot plates and insert the bolts and washers. Hand tighten the bolts.
- Add the bolts to the two swinging arm plates, reduce tension on the slings and adjust the vertical angle as required. Tighten all the bolts to the required torque (see section 1.1.14).

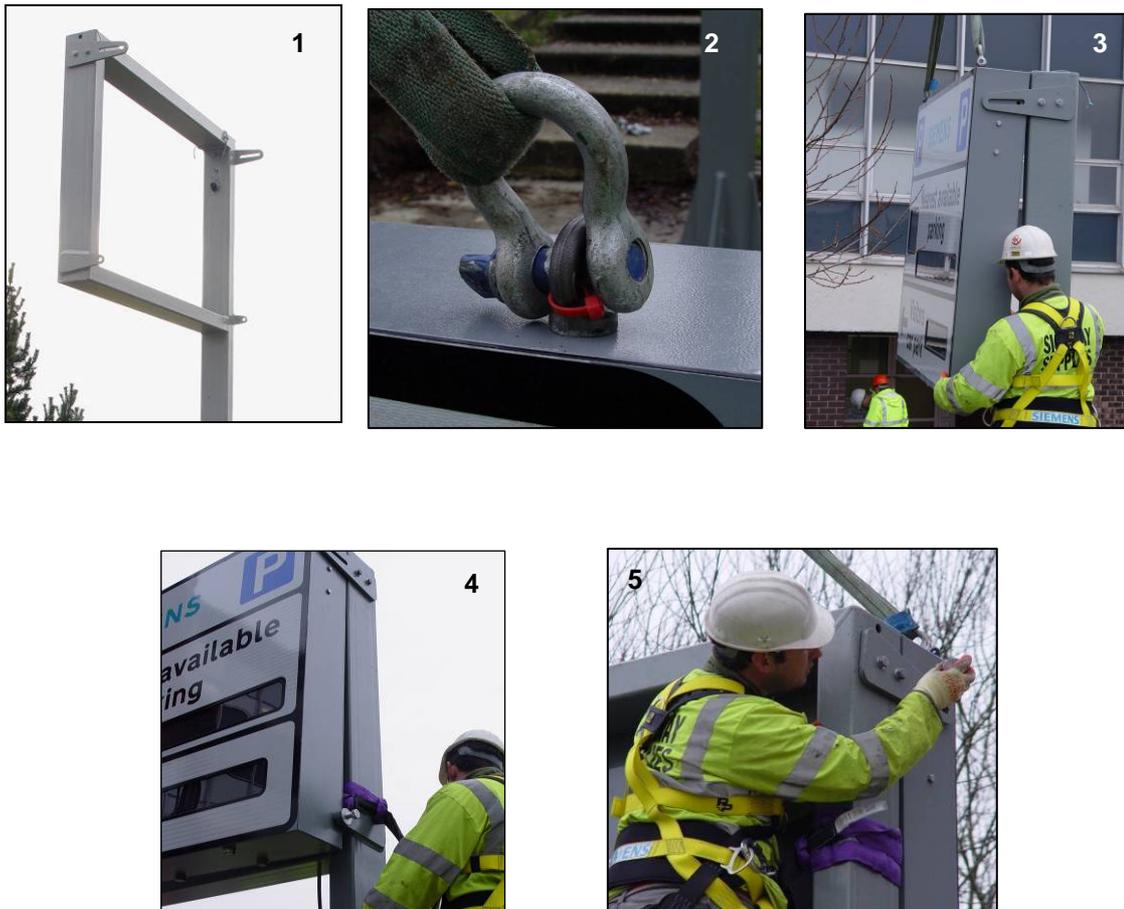


Figure 19 - Fitting the Sign Enclosure to the Cantilever

The sign will now be secured to the cantilever frame. Remove the lifting gear.

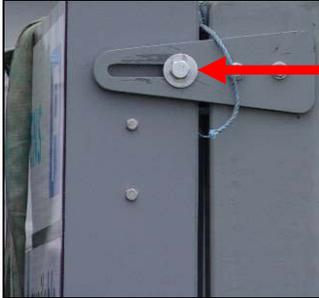
Remove the eye-bolts from the top of the sign and stow within the sign to allow them to be fitted if the sign needs to be lifted in future.

IMPORTANT

On removing the eye bolts, be sure to replace them with the supplied bolts and fibre washers to prevent water from entering the sign.

IMPORTANT

Do not work underneath the sign at any time when it is supported from lifting eyes.



Loosen bolts, adjust angle of sign then fully tighten bolts

Figure 20 - Cantilever Sign Elevation Adjustment

4.1.4 Cable Installation

This will take place as part of the 2nd site visit, once the sign is securely mounted on cantilever. Attach a draw rope to the cable. Check Risk Assessment and if safe to do so pull the cable through and up the pole from the feeder pillar or vice versa (G39 Authorisation required if cut-out installed in feeder pillar).

IMPORTANT

The feeder pillar may only be accessed by an operative who is G39 trained and DISTRIBUTION NETWORK OPERATOR DNO. REGIONAL ELECTRICITY COMPANY REC Authorised

Fit a gland suitable for hole in pole (Siemens part number 915/4/10316/000 is recommended) over the cable followed by a suitable length of flexible trunking (copex – Siemens part number 915/4/10315/004 is recommended) over the cable.

IMPORTANT

Only “A” Frame step ladders are to be used. On no account are ladders or steps to be leant up against the sign body or the pole. Use of the “A” Frame step ladders MUST comply with the Siemens “Access & Egress Code of Practice” Volumes 1 & 2

Feed the cable carefully through the gland on the rear of the sign into the sign enclosure itself.

IMPORTANT

There are many delicate electronic components on the rear of the circuit boards in the sign. Extreme care must be taken when feeding the cable through not to damage any of the boards.

Connection of the cable to the sign will be performed by Siemens engineers.



Figure 21 - Mains Cable Interface to Cantilever

5 APPENDIX A – ALIGNMENT OF SIGNS

The alignment of Elektra signs is less than critical than older Siemens signs due to the wider inherent beam angle of the Elektra optics.

Ideally, the aiming point of the signs should be advised by the customer, either in the contract documentation or at the site survey (see section 1.1.7).

If this is not possible, the following guidelines may be used to determine a suitable aiming point for the signs. Note that these guidelines assume a straight, level, road and may need modifying in the event of severe slopes, bends etc. Due account should also be taken of visual obstructions such as trees, bus shelters etc. which may already exist alongside the roadway.

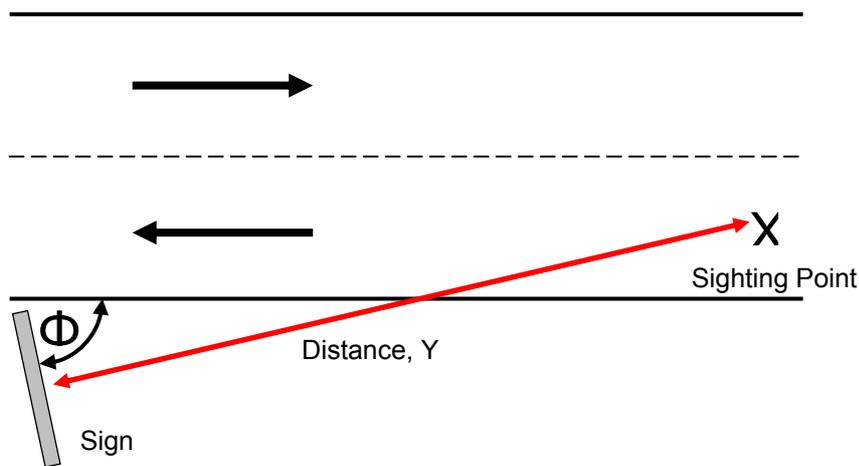


Figure 22 - Sign Alignment, Single Carriageway Road

For a single carriageway road, as shown in Figure 22, the sighting point will normally be in the centre of the traffic lane approaching the sign.

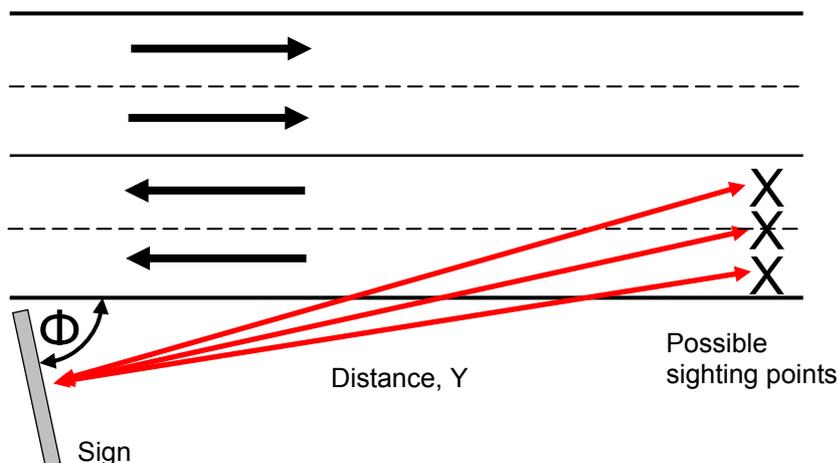


Figure 23 - Sign Alignment, Multi Carriageway Road

For a multi carriageway road, as shown in Figure 23, there is a choice of possible sighting points as indicated. The point chosen will depend upon whether the information on the sign is primarily for lane 1, lane2 or equally for both.

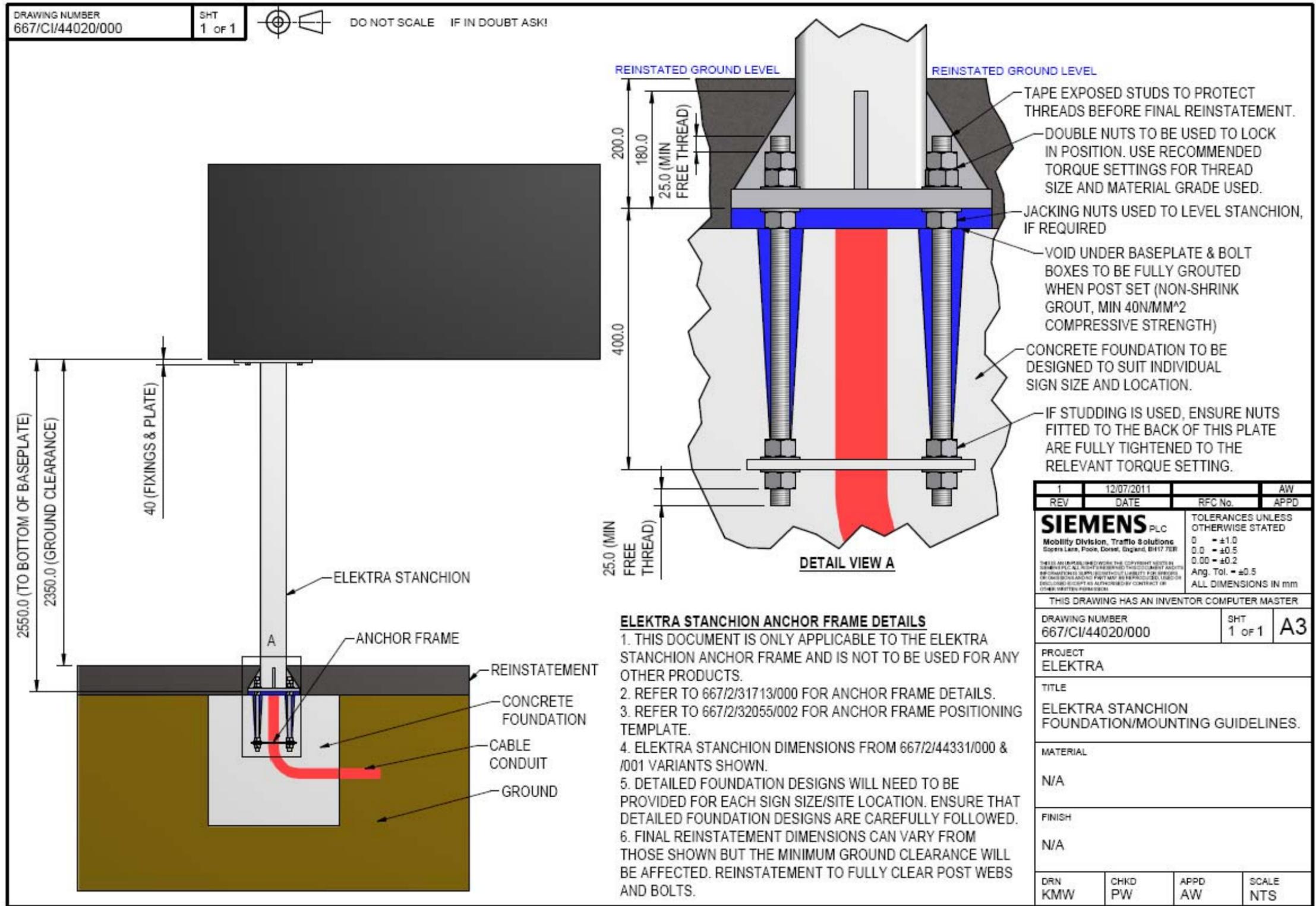
The distance, Y, and the angle, Φ , will both vary according to the speed of the road.

The figures in the table below may be used as sensible defaults.

85 percentile approach speed of private cars	Examples of typical road for which column 1 may apply	Minimum distance, Y in m
Up to 20 mph	Very narrow and urban roads	35
20 to 30 mph	Urban and rural roads of local character	45
30 to 40 mph	Urban and rural single 2-lane roads	60
40 to 50 mph	High standard rural single roads. Urban all-purpose dual carriageway roads	105
50 to 60 mph	Dual carriageway and wide single carriageway roads	135
60 to 70 mph	High standard all-purpose dual carriageway roads	180

When the above distances are used, the angle, Φ , will typically be in the region of 85 to 88 degrees (i.e. 3 – 5 degrees from a line perpendicular to the roadway) with the sign angled slightly towards the carriageway.

6 APPENDIX B – ELEKTRA STANCHION FOUNDATION GUIDELINES



1	12/07/2011		AW
REV	DATE	RFC No.	APPD
SIEMENS PLC		TOLERANCES UNLESS OTHERWISE STATED	
Mobility Division, Traffic Solutions		0 = ±1.0	
Sopers Lane, Poole, Dorset, England, BH17 7ER		0.0 = ±0.5	
THIS DOCUMENT IS THE PROPERTY OF SIEMENS PLC. ALL RIGHTS RESERVED. THIS DOCUMENT AND ITS CONTENTS ARE NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE WRITTEN PERMISSION OF SIEMENS PLC.		0.00 = ±0.2	
		Ang. Tol. = ±0.5	
		ALL DIMENSIONS IN mm	
THIS DRAWING HAS AN INVENTOR COMPUTER MASTER			
DRAWING NUMBER 667/CI/44020/000		SHT 1 OF 1	A3
PROJECT ELEKTRA			
TITLE ELEKTRA STANCHION FOUNDATION/MOUNTING GUIDELINES.			
MATERIAL N/A			
FINISH N/A			
DRN KMW	CHKD PW	APPD AW	SCALE NTS

7 APPENDIX C – ELEKTRA MULTIPOLE SPACING AND BRACKETS

VIEW FROM BACK OF SIGN

VIEW FROM FRONT OF SIGN

DETAIL VIEW A
0.08 : 1

NOTE 7 & 8 FOR BRACKET AND U-BOLT SELECTION

NOTES:

1. IN MULTIPOLE INSTALLATIONS THE ELEKTRA ENCLOSURE IS ALWAYS SUPPORTED ON TWO POLES. THE ENCLOSURE IS ATTACHED TO THE POLES BY A BRACKET AND U-BOLT AT EACH CORNER.
2. POLES MUST BE COMPLIANT WITH BS EN 12899. POLES MAY BE Ø139.7, Ø188.3 OR Ø193.7. FOUNDATION DESIGN IS TO BE BASED ON SIGN SIZE AND LOCATION AND MUST COMPLY WITH RELEVANT STANDARDS AND REGULATIONS.
3. THE OVERALL LENGTH OF THE POLES IS CALCULATED AS FOLLOWS:
OVERALL LENGTH OF POLE = L + H + A.
4. THE MINIMUM VALUE OF 'A' IS 140 mm. IF ADDITIONAL EQUIPMENT IS TO BE MOUNTED ON ONE OR BOTH POLES 'A' MAY VARY. IN THIS EVENT THE VALUE OF 'A' WILL BE ADVISED ON A SUPPLEMENTARY DRAWING.
5. REFER TO TABLE 1 TO DETERMINE THE DISTANCE BETWEEN POLE CENTRES (BC). 'BC' HAS A TOLERANCE OF ± 30 mm.
6. DISTANCES FROM POLE CENTRES TO ENCLOSURE (X AND Y) ARE GIVEN IN TABLE 1.
7. REFER TO TABLE 2 FOR BRACKET SELECTION.
8. REFER TO TABLE 3 FOR U-BOLT SELECTION.

POLE DIA	BC	X	Y
193.7	W-368 ± 30	184	125
188.3	W-336 ± 30	168	112
139.7	W-306 ± 30	153	98

POLE DIA	TOP BRKT	BOTTOM BRKT	POLE CLAMP
139.7	667/2/44587/X00	667/2/44588/X00	667/2/44584/X39
188.3	667/2/44587/X00	667/2/44588/X00	667/2/44584/X88
193.7	667/2/44587/X01	667/2/44588/X01	667/2/44584/X93

POLE DIA	U-BOLT
139.7	667/2/44582/539
188.3	667/2/44582/568
193.7	667/2/44582/593

2	07/03/2011	T802592	KMW
1	15/07/2010	T8025608	KW
REV	DATE	RFC No.	APPD
		TOLERANCES UNLESS OTHERWISE STATED Ø = ±0.5 D.D = ±0.2 D.M = ±0.05 Ang. 104 = ±0.5 ALL DIMENSIONS IN mm	
THIS DRAWING HAS AN INVENTOR COMPUTER MASTER			
PROJECT		<input checked="" type="checkbox"/> ALL RIGHTS RESERVED FOUNDATION COMPLIANT THE DATA DIRECTOR IN FORCE AT THE TIME OF SIGNATURE AND PRINTING CONDITIONS ARE APPLIED	
ELEKTRA			
TITLE			
MULTIPOLE SPACING AND BRACKETS			
MATERIAL			
FINISH			
DRN	CHKD	APPD	SCALE
PW	AJ	KW	DNS
SHT		DRAWING NUMBER	
1 of 1		667/CI/44010/000	

8 APPENDIX D – ELEKTRA MULTI POLE VARIANTS

